WHAT IS CLAIMED IS:

1. An apparatus for measuring one or more blood constituents in a subject, said apparatus comprising:

a first signal source which applies a first input signal during a first time interval;

a second signal source which applies a second input signal during a second time interval;

a detector which detects a first parametric signal responsive to said first input signal passing through a portion of said subject having blood therein and which detects a second parametric signal responsive to said second input signal passing through said portion of said subject, said detector generating a detector output signal responsive to said first and second parametric signals; and

a signal processor which receives said detector output signal, said signal processor demodulating said detector output signal by applying a first demodulation signal to a signal responsive to said detector output signal to generate a first demodulator output signal and applying a second demodulation signal to said signal responsive to said detector output signal to generate a second demodulator output signal, said first demodulation signal having at least one component comprising a frequency, a first amplitude, and a first phase, and said second demodulation signal having at least one component comprising said frequency, a second phase, and a second amplitude, at least one of said first phase, said second phase, said first amplitude, and said second amplitude chosen to reduce crosstalk from said first parametric signal to said second demodulator output signal and to reduce crosstalk from said second parametric signal to said first demodulator output signal.

2. The method of Claim 1, wherein at least a portion of one of said first phase, said second phase, said first amplitude, and said second amplitude is determined by turning off one of said first and second signal sources and measuring the crosstalk between one of the parametric signals and the non-corresponding output signal.

3. A method of reducing crosstalk between two signals generated by applying a first pulse and a second pulse to measure a parameter, wherein said first pulse and said second pulse are applied periodically at a first repetition rate defining a period, and wherein

said first pulse is generated during a first interval in each period and said second pulse is generated during a second interval in each period, said first and second pulses producing first and second parametric signals responsive to said parameter, said first and second parametric signals being received by a detector which outputs a composite signal responsive to said first and second parametric signals, said method comprising:

applying a first demodulation signal to said composite signal to generate a first demodulated output signal, said first demodulation signal comprising at least one component having at least a first amplitude and a first phase;

applying a second demodulation signal to said composite signal to generate a second demodulated output signal, said second demodulation signal comprising at least one component having at least a second amplitude and a second phase;

lowpass filtering said first demodulated output signal to generate a first recovered output signal responsive to said first parametric signal;

lowpass filtering said second demodulated output signal to generate a second recovered output signal responsive to said second parametric signal; and

choosing at least one of said first phase, said second phase, said first amplitude, and said second amplitude to reduce crosstalk components in said first recovered output signal and said second recovered output signal.

4. The method of Claim 3, wherein said choosing comprises:

applying said first light pulse during a first time period and measuring said first recovered output during said first time period as a first calibration output and measuring said second recovered output during said first time period as a second calibration output;

applying said second light pulse during a second time period and measuring said first recovered output during said first time period as a third calibration output and measuring said second recovered output during said second time period as a fourth calibration output; and

computing said first demodulation signal from at least said first calibration output, said second calibration output, said third calibration output, and said fourth calibration output.

5. The method of Claim 4, wherein at least a portion of said first demodulation signal is computed from a ratio of said first calibration pulse and said second calibration pulse.

6. The method of Claim 3, wherein said first demodulation signal comprises a sum of a first demodulation component having a first amplitude and a second demodulation component having a second amplitude, said second demodulation component in quadrature with said first demodulation component and wherein choosing said first phase comprises choosing said first amplitude and said second amplitude.

7. The method of Claim 3, wherein said first demodulation signal comprises a sum of a sinusoidal component having a first amplitude and a cosinusoidal component having a second amplitude, and wherein choosing said first phase comprises choosing said first amplitude and said second amplitude by using a least squares minimization of an error corresponding to said crosstalk.

8. The method of Claim 7, wherein said error is integrated over a time period.

9. The method of Claim 7, wherein said error is integrated over a time period corresponding to an integer number of cycles of said sinusoidal component.

10. A method of demodulating a composite signal generated by applying first and second periodic pulses of electromagnetic energy to a system having a parameter to be measured and by receiving signals responsive to said electromagnetic energy after having passed through said system and being affected by said parameter being measured, said signals received as a composite signal having first and second components responsive to said first and second pulses respectively, said method comprising:

applying a first demodulation signal to said composite signal to generate a first demodulated signal, said first demodulation signal comprising a first component having a first frequency corresponding to a repetition frequency of said first and second pulses and comprising a second component having said first frequency, said second component in phase quadrature with said first component, said first component having a first amplitude and said second component having a second amplitude, said second amplitude having a predetermined relationship to said first amplitude, said predetermined relationship selected to cause said first demodulated signal to have lower frequency components, said lower frequency components

comprising a primary component corresponding primarily to said first component and a residual component corresponding to said second component;

lowpass filtering said first demodulated signal to generate a first output signal;

adjusting at least one of a first amplitude, a second amplitude, a first phase, and a second phase to reduce said residual component with respect to said primary component.

11. The method as defined in Claim 10, further comprising:

applying a second demodulation signal to said composite signal to generate a second demodulated signal, said second demodulation signal having first and second components corresponding to said first and second components of said first demodulation signal, at least one of said first and second components of said second demodulation signal having a selected phase relationship with the corresponding one of said first and second components of said first demodulation signal; and

lowpass filtering said second demodulated signal to generate a second output signal, said second output signal varying in response to an effect of said parameter on the electromagnetic energy received from said second pulse.

12. The method of Claim 11, wherein said selected phase relationship reduces crosstalk.

13. A pulse oximetry system, comprising:

a modulation signal generator, said modulation signal generator generating a first modulation signal comprising a first pulse which repeats at a first repetition frequency, said first pulse having a duty cycle, said modulation signal generator generating a second modulation signal comprising a second pulse which also repeats at said first repetition frequency, said second pulse having a duty cycle, said second pulse occurring at non-overlapping times with respect to said first pulse, said first and second pulses comprising a plurality of components wherein a first component has a frequency corresponding to said repetition frequency and a second component has a second frequency corresponding to twice said first frequency, said second component having an amplitude which has a first predetermined relationship to an amplitude of said first component;

a first transmitter which emits electromagnetic energy at a first wavelength in response to said first pulse;

a second transmitter which emits electromagnetic energy at a second wavelength in response to said second pulse;

a detector which receives electromagnetic energy at said first and second wavelengths after passing through a portion of a subject and which generates a detector output signal responsive to the received electromagnetic energy, said detector output signal including a signal component responsive to attenuation of said electromagnetic energy at said first wavelength and a signal component responsive to attenuation of said electromagnetic energy at said second wavelength;

a first demodulator which multiplies said detector signal by a first demodulation signal and generates a first demodulated output signal;

a second demodulator which multiplies said detector signal by a second demodulation signal and generates a second demodulated output signal; and

a configuration module to configure said first demodulation signal and said second demodulation signal to substantially diagonalize said first demodulator and said second demodulator.

14. The pulse oximetry system of Claim 11, wherein said configuration module selects a phase relationship between said first demodulation signal and said second demodulation signal.

15. The pulse oximetry system of Claim 11, wherein said configuration module configures said first demodulation signal and said second demodulation signal using, at least in part, data obtained during a calibration period.

16. The pulse oximetry system of Claim 11, wherein said configuration module configures said first demodulation signal and said second demodulation signal using, at least in part, calibration data obtained during a calibration period, said calibration data comprising first and second calibration data corresponding to said first and second demodulated output signals during a first time period and third and fourth calibration data corresponding to said first and second demodulated output signals during a second time period, said second transmitter turned off during said first time period, said first transmitter turned off during said second time period.

17. The pulse oximetry system of Claim 11, wherein said configuration module configures said first demodulation signal and said second demodulation signal by adjusting initial parameters that define said first demodulation signal and said second demodulation signal, said configuration module adjusting said initial parameters using, at least in part, calibration data obtained during a calibration period, said calibration data comprising first and second calibration data corresponding to said first and second demodulated output signals during a first time period and third and fourth calibration data corresponding to said first and second demodulated output signals during a second time period, said second transmitter turned off during said first time period, said first transmitter turned off during said second time period.

18. An apparatus for demodulating a composite signal, comprising:

means for applying a first demodulation signal to said composite signal to generate a first demodulated signal comprising a primary component corresponding to a first component of said composite signal and a residual component corresponding to a second component of said composite signal;

means for adjusting a phase of said demodulation signal to reduce said residual component with respect to said primary component.

19. The apparatus of Claim 10, further comprising:

means for applying a second demodulation signal to said composite signal to generate a second demodulated signal comprising a primary component corresponding to said second component of said composite signal and a residual component corresponding to said first component of said composite signal;

means for adjusting a phase of said second demodulation signal to reduce said residual component with respect to said primary component.